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File: USPT

Apr 3, 1984

DOCUMENT-IDENTIFIER: US 4440447 A

TITLE: Method for forming an in situ oil shale retort with explosive expansion towards a horizontal free faceAbstract Text (1):

A fragmented permeable mass of formation particles containing oil shale and having a substantially uniformly distributed void fraction is formed in an in situ oil shale retort in a subterranean formation containing oil shale. The fragmented mass is formed by explosive expansion towards a horizontal free face. At least one generally horizontally extending void is formed in the subterranean formation and zones of unfragmented formation are left above and below such a void. An array of horizontally spaced apart substantially vertical columnar explosive charges is formed in at least one of the zones of unfragmented formation. The array of explosive charges includes a plurality of central explosive charges which are spaced apart from side boundaries of the retort and a plurality of outer explosive charges surrounding the central charges. Explosive in each outer explosive charge extends nearer the free face toward which unfragmented formation is to be explosively expanded than any portion of the explosive in a central explosive charge. Additionally, each outer explosive charge has a scaled depth of burial which is no greater than the scaled depth of burial of each central explosive charge. The explosive charges are thereafter detonated for explosively expanding the zone of unfragmented formation toward the void, forming the fragmented permeable mass of formation particles in the in situ oil shale retort.

Brief Summary Text (10):

U.S. Pat. Nos. 4,043,597; 4,043,598; and 4,192,554 disclose methods for explosively expanding formation containing oil shale toward horizontal free faces to form a fragmented mass in an in situ oil shale retort. According to such a method, a plurality of vertically spaced apart voids of similar horizontal cross-section are initially excavated one above another within the retort site. A plurality of vertically spaced apart zones of unfragmented formation are temporarily left between the voids. An array of vertical columnar explosive charges is placed in each of the unfragmented zones and detonated to explosively expand each unfragmented zone upwardly and/or downwardly towards the void or voids above and/or below it to form a fragmented mass having an average void volume about equal to the void volume of the initial voids. Retorting of the fragmented mass is then carried out to recover shale oil from the oil shale.

Brief Summary Text (11):

U.S. Patent application Ser. No. 070,319 discloses a method for explosively expanding formation containing oil shale towards a horizontal free face to form a fragmented mass in an in situ oil shale retort. According to such a method, a void having a horizontal cross-section similar to the horizontal cross-section of the retort being formed is initially excavated. A plurality of vertically spaced apart zones of unfragmented formation are left above the void. Explosive is placed in each of the unfragmented zones and detonated for explosively expanding such zones towards the void to form a fragmented mass in the retort having an average void volume about equal to the void volume of the initial void. The overlying zones can be expanded towards the void in a single round or a plurality of rounds. Retorting of the fragmented mass is then carried out to recover shale oil from the oil shale.

Brief Summary Text (13):

When using vertical columnar explosive charges for explosively expanding formation, some of the charges can be located close to the vertical walls of a void towards which expansion is directed. These charges are not free to crater upward, but are confined on one side by the wall. Formation expanded by these charges is directed inwardly away from the walls and not vertically, as desired. This can cause the fragmented mass of

long post -
varies expl.
in barrels
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in middle

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<u>L6</u>	energy same reduc\$	157090	<u>L6</u>
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